THEREFORE WHAT IS CLAIMED IS:

1. A wavelength-division multiplexed optical communication network, comprising:

a) an optical signal transmitter including,

i) an optical signal source array having at least two optical signal sources, each optical signal source producing optical signal pulses in a wavelength channel associated therewith, each of the at least two optical signal sources being optically coupled to an associated optical signal modulator for modulating the optical signal pulses that are output from the optical signal source coupled thereto to encode information onto the optical signal pulses in each wavelength channel,

ii) a multiplexer, each optical signal modulator having an output being optically coupled to the multiplexer for multiplexing the modulated optical signal pulses in all the wavelength channels,

iii) an optical signal pulse stretcher being optically coupled to an output of the multiplexer for temporally chirping the multiplexed modulated optical signal pulses;

iv) an optical fiber having opposed ends being optically coupled at one of the opposed ends to an output of the optical signal pulse stretcher through which the temporally chirped multiplexed modulated optical signal pulses are transmitted; and

b) an optical signal receiver optically coupled to the optical fiber for receiving the temporally chirped multiplexed modulated optical signal pulses, the optical signal receiver including,

i) an optical signal pulse compressor having an input optically coupled to the other of the opposed ends of the optical fiber for temporally de-chirping the temporally chirped multiplexed modulated optical signal pulses for reconstructing the multiplexed modulated optical signal pulses,

ii) a demultiplexer having an input optically coupled to an output of the optical signal pulse compressor for demultiplexing the reconstructed multiplexed modulated optical signal pulses to reconstruct the modulated optical signal pulses in each of the wavelength channels, and

iii) an array of optical detectors, each of the optical detectors being connected to an associated output of the demultiplexer for converting the reconstructed modulated optical signal pulses in each wavelength channel to modulated electrical signal pulses, each optical detector including a filter electrically connected thereto for filtering the modulated electrical signal pulses produced therein with each filter having a predefined filter bandwidth for removing out-of-band frequency components due to four wave mixing arising from multiplexing the modulated optical signal pulses in the wavelength channels.

2. The optical communication network according to claim 1 wherein the optical signal modulators produce modulated optical signals pulses in a return-to-zero (RZ) format.

3. The optical communication network according to claim 2 including at least one optical amplifier inserted between optical signal pulse stretcher and the optical signal pulse compressor for amplifying the temporally-chirped multiplexed modulated optical signal pulses.

4. The optical communication network according to claim 3 wherein the at least one optical amplifier is two optical amplifiers, an optical boost amplifier being inserted between the optical signal pulse stretcher and the optical fiber, and wherein an optical pre-amplifier is inserted between the optical fiber and the optical signal pulse compressor.

5. The optical communication network according to claim 4 wherein the two amplifiers are erbium-doped fiber amplifiers (EDFAs).

6. The optical communication network according to claim 4 wherein the two amplifiers are semiconductor optical amplifiers (SOAs) or Raman amplifiers.

7. The optical communication network according to claim 2 wherein the optical fiber includes at least two spans of optical fiber, including at least one optical boost amplifier inserted between the at least two spans of optical fiber.

8. The optical communication network according to claim 2 wherein the optical signal pulse stretcher applies a linear chirp of given slope to the multiplexed modulated optical signal pulses, and wherein the optical pulse compressor applies a linear chirp to the temporally chirped multiplexed modulated optical signal pulses which has a slope of opposite sign to the given slope.

9. The optical communication network according to claim 2 wherein the optical fiber includes at least two spans of optical fiber, and including an optical dispersive element inserted between the at least two spans of optical fiber for reversing a sign of the temporal chirp applied to the optical signal pulses in each wavelength channel, and wherein the optical pulse compressor has an appropriate magnitude and sign to substantially reconstruct the optical signal pulses.

10. The optical communication network according to claim 9 including at least one optical boost amplifier inserted between the at least two spans of optical fiber.

11. The optical communication network according to claim 2 wherein the optical signal pulse stretcher includes a chirped fiber Bragg grating optically coupled to an optical branch device, and wherein a chirp of the chirped fiber Bragg grating is chosen in such a way that the optical pulses are stretched by a desired amount, and wherein the optical signal pulse compressor includes a chirped fiber Bragg grating optically coupled to an optical branch device, and wherein a chirp of the chirped fiber Bragg grating is chosen in such a way that the optical pulses are compressed by a desired amount.

12. The optical communication network according to claim 2 wherein the optical signal pulse stretcher includes a segment of dispersive optical fiber having a chromatic dispersion value chosen in such a way that the optical pulses are stretched by an appropriate amount, and wherein the optical signal pulse compressor includes a segment of dispersive optical fiber having a chromatic dispersion value chosen in such a way that the optical pulses are compressed by an appropriate amount.

13. The optical communication network according to claim 2 including processing means connected to the optical communication network for performing forward error correction to further enhance the system performance.

14. A wavelength-division multiplexed optical communication network, comprising:

a) an optical signal transmitter including,

i) an optical signal source array having at least two optical signal sources, each optical signal source producing optical signal pulses in a wavelength channel associated therewith, each of the at least two optical signal sources being optically coupled to an associated optical signal modulator for modulating the optical signal pulses that are output from the optical signal source coupled thereto to encode information onto the optical signal pulses in each of the wavelength channels,

ii) each optical signal modulator being optically coupled to an input of an associated optical signal pulse stretcher for temporally chirping the modulated optical signal pulses produced in the optical signal modulator coupled thereto,

iii) a multiplexer, each optical signal pulse stretcher including an output being optically coupled to the multiplexer for multiplexing the temporally chirped modulated optical signal pulses in all the wavelength channels;

iv) an optical fiber having opposed ends being optically coupled at one of the opposed ends to an output of the multiplexer through which the multiplexed temporally chirped modulated optical signal pulses are transmitted; and

b) an optical signal receiver optically coupled to the optical fiber for receiving the multiplexed temporally chirped modulated optical signal pulses, the optical signal receiver including,

i) a demultiplexer having an input being optically coupled to the other of the opposed ends of the optical fiber for demultiplexing the multiplexed temporally-chirped modulated optical signal pulses for reconstructing the temporally-chirped modulated optical signal pulses in each of the wavelength channels;

ii) an array of optical signal pulse compressors, each optical pulse compressor having an input optically coupled to an output of the demultiplexer for temporally de-chirping the demultiplexed temporally chirped modulated optical signal pulses to reconstruct the modulated optical signal pulses in each of the respective wavelength channels; and

iii) an array of optical detectors, each optical detector being optically coupled to an output of an associated optical signal pulse compressor for converting the reconstructed modulated optical signal pulses in each wavelength channel to modulated electrical signal pulses, each optical detector including a filter electrically connected thereto for filtering the modulated electrical signal pulses with each filter having a pre-defined filter bandwidth for removing out-of-band frequency components due to four wave mixing arising from multiplexing the modulated optical signal pulses in all the wavelength channels.

15. The optical communication network according to claim 14 wherein the optical signal modulators produce modulated optical signals pulses in a return-to-zero (RZ) format.

16. The optical communication network according to claim 15 including at least one optical amplifier inserted between the multiplexer and the demultiplexer for amplifying the multiplexed temporarily chirped modulated optical signal pulses.

17. The optical communication network according to claim 16 wherein the at least one optical amplifier is two optical amplifiers, an optical boost amplifier being optically inserted between the multiplexer and the optical fiber, and wherein an optical pre-amplifier is optically inserted between the optical fiber and the demultiplexer.

18. The optical communication network according to claim 17 wherein said two amplifiers are erbium-doped fiber amplifiers (EDFAs).

19. The optical communication network according to claim 17 wherein said two amplifiers are semiconductor optical amplifiers (SOAs) or Raman amplifiers.

20. The optical communication network according to claim 15 wherein the optical fiber includes at least two spans of optical fiber, including at least one optical boost amplifier inserted between said at least two spans of optical fiber.

21. The optical communication network according to claim 20 wherein including an optical boost amplifier optically inserted between the multiplexer and the optical fiber in a first of the at least two spans of optical fiber, and wherein an optical pre-amplifier is optically inserted between the optical fiber in a second of the at least two spans of optical fiber and the demultiplexer.

22. The optical communication network according to claim 15 wherein a sign of the temporal chirp applied by the optical signal pulse stretchers may vary on a per wavelength channel basis, wherein for a given wavelength channel, a sign of the temporal chirp of the compressor is chosen to be opposite to that applied by the corresponding stretcher to the given wavelength channel.

23. The optical communication network according to claim 22 wherein the optical signal pulse stretchers and optical signal pulse compressors apply alternating values of positive and negative chirp, so that adjacent wavelength channels have opposite chirp signs when propagating through the optical fiber.

24. The optical communication network according to claim 15 wherein each optical signal pulse stretcher for temporally chirping the optical signal pulses has the same chirp value, and wherein each optical signal pulse compressor for temporally de-chirping the optical signal pulses applies a different chirp value to offset effects of chromatic dispersion of the optical transmission medium on each wavelength channel.

25. The optical communication network according to claim 15 wherein each optical signal pulse stretcher applies a linear temporal chirp of given slope to the modulated optical signal pulses in the respective wavelength channel associated therewith, and wherein the optical pulse compressor associated with said given wavelength channel applies a linear chirp with a slope of opposite sign to the given slope.

26. The optical communication network according to claim 15 wherein the optical fiber includes at least two spans of optical fiber, and including an optical dispersive element inserted between said at least two spans of optical fiber for reversing a sign of the temporal chirp applied to the optical pulses in each wavelength channel, and wherein each optical pulse compressor has an appropriate magnitude and sign to substantially reconstruct the optical pulses in its respective wavelength channel.

27. The optical communication network according to claim 26 including at least one optical boost amplifier inserted between the at least two spans of optical fiber.

28. The optical communication network according to claim 15 wherein the optical signal pulse stretcher includes a chirped fiber Bragg grating optically coupled to an optical branch device, and wherein a chirp of the chirped fiber Bragg grating is chosen in such a way that the optical pulses are stretched by a desired amount, and wherein the optical signal pulse compressor includes a chirped fiber Bragg grating optically coupled to an optical branch device, and wherein a chirp of the chirped fiber Bragg grating is chosen in such a way that the optical pulses are compressed by a desired amount.

29. The optical communication network according to claim 15 wherein the optical signal pulse stretcher includes a segment of dispersive optical fiber having a chromatic dispersion value chosen in such a way that the optical pulses are stretched by an appropriate amount, and wherein the optical signal pulse compressor includes a segment of dispersive optical fiber having a chromatic dispersion value chosen in such a way that the optical pulses are compressed by an appropriate amount.

30. The optical communication network according to claim 15 including processing means connected to the optical communication network for

performing forward error correction to further enhance the system performance.

31. A method of suppressing four-wave mixing in a wavelength-division multiplexed optical communication network, comprising the steps of:

a) generating optical signal pulses in at least two wavelength channels and modulating the optical signal pulses in each of said at least two wavelength channels for encoding information onto the optical signal pulses in each of said at least two wavelength channels;

b) multiplexing the modulated optical signal pulses in each of said at least two wavelength channels;

c) temporally chirping the multiplexed modulated optical signal pulses;

d) transmitting the temporally chirped multiplexed modulated optical signal pulses through an optical fiber to a receiver;

e) temporally de-chirping the temporally chirped multiplexed modulated optical signal pulses at the receiver optically coupled to the optical fiber for reconstructing the originally multiplexed modulated optical signal pulses;

f) demultiplexing the de-chirped multiplexed modulated optical signal pulses to reconstruct the modulated optical signal pulses in each of said at least two wavelength channels;

g) detecting and converting the reconstructed modulated optical signal pulses in each of said at least two wavelength channels to associated modulated electrical signal pulses; and

h) filtering said associated modulated electrical signal pulses to remove out-of-band high frequency components due to four wave mixing of the multiplexed modulated optical signal pulses in each of said at least two wavelength channels.

32. The method according to claim 31 wherein the step of modulating the optical signal pulses in each of said at least two wavelength channels includes producing modulated optical signals pulses in a return-to-zero (RZ) format.

33. The method according to claim 32 including amplifying the temporally chirped multiplexed modulated optical signal pulses.

34. The method according to claim 33 wherein the temporally chirped multiplexed modulated optical signal pulses are amplified using one or more erbium-doped fiber amplifier (EDFAs).

35. The method according to claim 33 wherein the temporally chirped multiplexed modulated optical signal pulses are amplified using one or more semiconductor optical amplifier (SOAs) or Raman amplifiers.

36. The method according to claim 33 wherein the temporally chirped multiplexed modulated optical signal pulses are amplified using two optical

amplifiers, one of the two optical amplifiers being an optical boost amplifier and the other amplifier being an optical pre-amplifier.

37. The method according to claim 32 wherein the optical fiber includes at least two spans of optical fiber, including at least one optical boost amplifier inserted between the at least two spans of optical fiber.

38. The method according to claim 32 wherein the step of temporally chirping the multiplexed modulated optical signal pulses includes applying a linear chirp of given slope to the multiplexed modulated optical signal pulses in all of the at least two wavelength channels, and wherein the step of temporally de-chirping the temporally chirped multiplexed modulated optical signal pulses includes

applying a linear chirp to the temporally chirped multiplexed modulated optical signal pulses which has a slope of opposite sign to the given slope.

39. The method according to claim 32 wherein the optical fiber includes at least two spans of optical fiber, and including an optical dispersive element inserted between said at least two spans of optical fiber for reversing a sign of the temporal chirp applied to the optical pulses in each wavelength channel, and wherein the step of temporally de-chirping the temporally chirped multiplexed modulated optical signal pulses includes applying a de-chirp

value having an appropriate magnitude and sign to substantially reconstruct the optical pulses.

40. The method according to claim 39 wherein the temporally chirped multiplexed modulated optical signal pulses are amplified by an optical boost amplifier inserted between the at least two spans of optical fiber.

41. The method according to claim 32 wherein forward error correction is used to further enhance the system performance.

42. The method according to claim 32 wherein the step of temporally chirping the multiplexed modulated optical signal pulses for stretching the multiplexed modulated optical signal pulses includes

a) transmitting the multiplexed modulated optical signal pulses through an optical branch device,

b) reflecting the multiplexed modulated optical signal pulses using an optically chirped fiber Bragg grating with a chirp value chosen in such a way that the optical pulses are stretched by a selected amount, and

c) re-transmitting the stretched reflected multiplexed modulated optical signal pulses back through the optical branch device.

43. The method according to claim 32 wherein the step of temporally de-chirping the multiplexed modulated optical signal pulses for compressing the

multiplexed modulated optical signal pulses back to their original pulse shapes includes

a) transmitting the multiplexed modulated optical signal pulses through an optical branch device,

b) reflecting the temporally chirped multiplexed modulated optical signal pulses using an optically chirped fiber Bragg grating with a chirp value chosen in such a way that the optical pulses are compressed by a selected amount to give the original pulse shapes, and

c) re-transmitting the compressed reflected multiplexed modulated optical signal pulses back through the optical branch device.

44. The method according to claim 32 wherein the step of temporally chirping the multiplexed modulated optical signal pulses for stretching the multiplexed modulated optical signal pulses includes transmitting the multiplexed modulated optical signal pulses through a dispersive optical fiber having a chromatic dispersion value chosen in such a way that the multiplexed modulated optical signal pulses are stretched by the appropriate amount.

45. The method according to claim 32 wherein the step of temporally de-chirping the multiplexed modulated optical signal pulses for compressing the multiplexed modulated optical signal pulses to give the original pulse shapes includes transmitting the multiplexed modulated optical signal pulses through

a dispersive optical fiber having a chromatic dispersion value chosen in such a way that the multiplexed modulated optical signal pulses are compressed by the appropriate amount to give the original optical signal pulse shapes.

46. A method of suppressing four wave mixing in a wavelength-division multiplexed optical communication network, comprising the steps of:

a) generating optical signal pulses in at least two wavelength channels and modulating the optical signal pulses in each of the at least two wavelength channels for encoding information onto the optical signal pulses in each of the at least two wavelength channels;

b) temporally chirping the modulated optical signal pulses in each of the at least two wavelength channels;

c) multiplexing the temporally chirped modulated optical signal pulses in each of the at least two wavelength channels;

d) transmitting the multiplexed temporally chirped modulated optical signal pulses through an optical fiber to a receiver;

e) demultiplexing the multiplexed temporally chirped modulated optical signal pulses received at the receiver to reconstruct the temporally chirped modulated optical signal pulses in each of the at least two wavelength channels;

f) temporally de-chirping the temporally chirped modulated optical signal pulses in each of the at least two wavelength channels to reconstruct

the modulated optical signal pulses in each of the at least two wavelength channels;

g) detecting and converting the reconstructed modulated optical signal pulses in each of the at least two wavelength channels to associated modulated electrical signal pulses; and

h) filtering the associated modulated electrical signal pulses to remove out-of-band high frequency components due to four wave mixing of the multiplexed modulated optical signal pulses in each of the at least two wavelength channels.

47. The method according to claim 46 wherein the step of modulating the optical signal pulses in each of said at least two wavelength channels includes producing modulated optical signals pulses in a return-to-zero (RZ) format.

48. The method according to claim 47 including amplifying the multiplexed temporally chirped modulated optical signal pulses.

49. The method according to claim 48 wherein the multiplexed temporally chirped modulated optical signal pulses are amplified using one or more erbium-doped fiber amplifiers (EDFAs).

50. The method according to claim 48 wherein the multiplexed temporally chirped modulated optical signal pulses are amplified using one or more semiconductor optical amplifiers (SOAs) or Raman amplifiers.

51. The method according to claim 48 wherein the multiplexed temporally chirped modulated optical signal pulses are amplified using two optical amplifiers, one of said optical amplifiers being an optical boost amplifier and the other amplifier being an optical pre-amplifier.

52. The method according to claim 47 wherein the optical fiber includes at least two spans of optical fiber, including at least one optical boost amplifier inserted between the at least two spans of optical fiber.

53. The method according to claim 47 wherein the optical fiber includes at least two spans of optical fiber, and including an optical dispersive element inserted between said at least two spans of optical fiber for reversing a sign of the temporal chirp applied to the optical pulses in each wavelength channel, and wherein said step of temporally de-chirping the temporally chirped multiplexed modulated optical signal pulses includes applying a de-chirp value having an appropriate magnitude and sign to substantially reconstruct the optical pulses.

54. The method according to claim 53 wherein the temporally chirped multiplexed modulated optical signal pulses are amplified by an optical boost amplifier inserted between the at least two spans of optical fiber.

55. The method according to claim 47 wherein the step of temporally chirping the modulated optical signal pulses includes varying, on a per wavelength channel basis, a sign of the temporal chirp applied to the modulated optical signal pulses in each of the at least two wavelength channels, wherein for a given wavelength channel, a sign of the temporal chirp applied thereto is chosen to be opposite to that of the de-chirp signal applied to the given wavelength channel.

56. The method according to claim 55 wherein alternating values of positive and negative chirp and de-chirp are applied to the wavelength channels, so that adjacent wavelength channels have opposite chirp and de-chirp signs when propagating through the optical transmission medium.

57. The method according to claim 47 wherein the step of temporally chirping the modulated optical signal pulses in each of the at least two wavelength channels includes temporally chirping the optical signal pulses in each of the at least two wavelength bands with a chirp having the same value for each wavelength channel, and wherein the step of temporally de-chirping the optical signal pulses includes applying a different chirp value to each

wavelength channel to offset effects of chromatic dispersion of the optical transmission medium on each wavelength channel.

58. The method according to claim 47 wherein the step of temporally chirping the modulated optical signal pulses in each of the at least two wavelength channels includes applying a linear chirp of given slope to the modulated optical signal pulses in a given wavelength channel, and wherein the step of temporally de-chirping the temporally chirped modulated optical signal pulses in each of the at least two wavelength channels includes applying to the modulated optical signal pulses in the given wavelength channel a linear temporal chirp with a slope of opposite sign to the given slope.

59. The method according to claim 47 wherein forward error correction is used to further enhance the system performance.

60. The method according to claim 47 wherein the step of temporally chirping the modulated optical signal pulses for stretching the modulated optical signal pulses in each of said at least two wavelength channels includes

a) transmitting the modulated optical signal pulses in each wavelength channel through an optical branch device and then reflecting them using an

optically chirped fiber Bragg grating with a chirp value chosen in such a way that the optical pulses are stretched by a selected amount, and

b) re-transmitting the stretched reflected multiplexed modulated optical signal pulses back through the optical branch device.

61. The method according to claim 47 wherein the step of temporally de-chirping the multiplexed modulated optical signal pulses for compressing the multiplexed modulated optical signal pulses back to their original pulse shapes in each of said at least two wavelength channels includes

a) transmitting the modulated optical signal pulses in each wavelength channel through an optical branch device and then reflecting them back through the optical branch device using an optically chirped fiber Bragg grating with a chirp value chosen in such a way that the optical pulses are compressed by a selected amount to give the original pulse shapes, and

b) re-transmitting the compressed reflected multiplexed modulated optical

signal pulses back through an output of the optical branch device.

62. The method according to claim 47 wherein the step of temporally chirping the multiplexed modulated optical signal pulses for stretching the multiplexed modulated optical signal pulses in each wavelength channel includes transmitting the multiplexed modulated optical signal pulses in each wavelength channel through a section of an associated dispersive optical

fiber having a chromatic dispersion value chosen in such a way that the multiplexed modulated optical signal pulses are stretched by the appropriate amount.

63. The method according to claim 47 wherein the step of temporally de-chirping the multiplexed modulated optical signal pulses for compressing the multiplexed modulated optical signal pulses to give the original pulse shapes includes transmitting the multiplexed modulated optical signal pulses through a section of an associated dispersive optical fiber having a chromatic dispersion value chosen in such a way that the multiplexed modulated optical signal pulses are compressed by the appropriate amount to give the original optical signal pulse shapes.

64. A method of suppressing four-wave mixing in a wavelength-division multiplexed optical communication network, comprising the steps of:

a) generating a set of odd wavelength channels and modulating optical signal pulses in each of the odd wavelength channels for encoding information onto the optical signal pulses in each of the odd wavelength channels;

b) generating set of even wavelength channels and modulating optical signal pulses in each of the even wavelength channels for encoding information onto the optical signal pulses in each of the even wavelength channels;

c) multiplexing the modulated optical signal pulses in the odd wavelength channels;

d) multiplexing the modulated optical signal pulses in the even wavelength channels;

e) temporally chirping the multiplexed modulated optical signal pulses in the odd wavelength channels;

f) temporally chirping the multiplexed modulated optical signal pulses in the even wavelength channels;

g) interleaving the temporally chirped multiplexed modulated optical signal pulses in each of the odd wavelength channels with the temporally chirped multiplexed modulated optical signal pulses in each of the even wavelength channels;

h) transmitting the interleaved, temporally chirped multiplexed modulated optical signal pulses in the odd and even wavelength channels through an optical fiber to a receiver;

i) de-interleaving the interleaved, temporally chirped multiplexed modulated optical signal pulses in the odd and even wavelength channels, temporally de-chirping the temporally chirped multiplexed modulated optical signal pulses in the odd wavelength channels thereby reconstructing the multiplexed modulated optical signal pulses in the set of odd wavelength channels, temporally de-chirping the temporally chirped multiplexed modulated optical signal pulses in the even set wavelength channels thereby

reconstructing the multiplexed modulated optical signal pulses in the set of even wavelength channels;

j) demultiplexing the temporally de-chirped multiplexed modulated optical signal pulses in the set of odd wavelength channels thereby reconstructing the modulated optical signal pulses in each of the odd wavelength channels, demultiplexing the temporally de-chirped multiplexed modulated optical signal pulses in the set of even wavelength channels thereby reconstructing the modulated even wavelength optical signal pulses in each of the even wavelength channels;

g) detecting and converting the reconstructed modulated optical signal pulses in each of the odd and even set of wavelength channels respectively to associated modulated electrical signal pulses; and

h) filtering the modulated electrical signal pulses associated with each wavelength channel of the odd and even set of wavelength channels to remove out-of-band high frequency components due to four wave mixing of the multiplexed modulated optical signal pulses in the odd and even sets wavelength channels.

65. The method according to claim 64 wherein in steps e) and f) a chirp of selected value is applied to the multiplexed modulated optical signal pulses in each of the odd wavelength channels and a chirp of opposite sign but the same magnitude as the selected value is applied to the multiplexed modulated optical signal pulses in each of the even wavelength channels, and

wherein in step j) the step of temporally de-chirping the temporally chirped multiplexed modulated optical signal pulses in the odd set of wavelength channels includes applying a de-chirp of opposite sign to the sign of the chirp value applied to the multiplexed modulated optical signal pulses in each of the odd set of wavelength channels, and wherein in step j) the step of temporally de-chirping the temporally chirped multiplexed modulated optical signal pulses in the even set of wavelength channels includes applying a de-chirp of opposite sign to the sign of the chirp value applied to the multiplexed modulated optical signal pulses in each of the even set wavelength channels.

66. The method according to claim 65 wherein the step of modulating the optical signal pulses in each of the odd and even set of wavelength channels includes producing modulated optical signals pulses in a return-to-zero (RZ) format.

67. The method according to claim 66 including amplifying the interleaved temporally chirped multiplexed modulated optical signal pulses.

68. The method according to claim 67 wherein the temporally chirped multiplexed modulated optical signal pulses are amplified using one or more erbium-doped fiber amplifier (EDFAs).

69. The method according to claim 67 wherein the temporally chirped multiplexed modulated optical signal pulses are amplified using one or more semiconductor optical amplifier (SOAs) or Raman amplifiers.

70. The method according to claim 67 wherein the temporally chirped multiplexed modulated optical signal pulses are amplified using two optical amplifiers, one of the two optical amplifiers being an optical boost amplifier and the other amplifier being an optical pre-amplifier.

71. The method according to claim 67 wherein the optical fiber includes at least two spans of optical fiber, including at least one optical boost amplifier inserted between the at least two spans of optical fiber.

72. A wavelength-division multiplexed optical communication network, comprising:

a) an optical signal transmitter including,

i) an optical signal source array having

a first array of optical signal sources for producing optical signal pulses in at least two odd wavelength channels, each of the optical signal sources in the first array of optical signal sources being optically coupled to an associated optical signal modulator for modulating the optical signal pulses that are output from the optical signal source coupled thereto to encode

information onto the optical signal pulses in each of the odd wavelength channels;

a second array of optical signal sources for producing optical signal pulses in at least two even wavelength channels, each of the optical signal sources in the second array of optical signal sources being optically coupled to an associated optical signal modulator for modulating the optical signal pulses that are output from the optical signal source coupled thereto to encode information onto the optical signal pulses in each of the even wavelength channels;

ii) a first multiplexer, each optical signal modulator connected to the optical signal sources in the first array of optical signal sources having an output which is optically coupled to the first multiplexer for multiplexing the modulated optical signal pulses in the odd wavelength channels, a second multiplexer, each optical signal modulator connected to the optical signal sources in the second array of optical signal sources having an output which optically coupled to the second multiplexer for multiplexing the modulated optical signal pulses in the even wavelength channels;

iii) a first optical signal pulse stretcher being optically coupled to an output of the first multiplexer for temporally chirping the multiplexed modulated optical signal pulses in the odd wavelength channels, a second optical signal pulse stretcher being optically coupled to an output of the second multiplexer for temporally chirping the multiplexed modulated optical signal pulses in the even wavelength channels, the second optical signal

pulse stretcher applying a temporal chirp to the multiplexed modulated optical signal pulses in the even wavelength channels which is of opposite sign to a temporal chirp applied to the multiplexed modulated optical signal pulses in the odd wavelength channels by the first optical signal pulse stretcher;

iv) an optical signal pulse interleaver optically coupled to an output of each of the first and second multiplexors for interleaving the temporally chirped multiplexed modulated optical signal pulses in the odd wavelength channels with the temporally chirped multiplexed modulated optical signal pulses in the odd wavelength channels;

v) an optical fiber having opposed ends being optically coupled at one of the opposed ends to an output of the interleaver through which the interleaved, temporally chirped multiplexed modulated optical signal pulses from the odd and even wavelength channels are transmitted; and

b) an optical signal receiver for receiving the interleaved temporally chirped multiplexed modulated optical signal pulses from the odd and even wavelength channels, the optical signal receiver including,

i) an optical signal pulse de-interleaver being optically coupled to the other of the opposed ends of the optical fiber for de-interleaving the interleaved, temporally chirped multiplexed modulated optical signal pulses from the odd and even wavelength channels,

ii) a first optical signal pulse compressor being optically coupled to a first output of the de-interleaver for temporally de-chirping the multiplexed modulated optical signal pulses in the odd wavelength channels with a

temporal chirp of opposite sign to the temporal chirp applied by the first optical signal pulse stretcher for reconstructing the multiplexed modulated optical signal pulses in the odd wavelength channels, a second optical signal pulse compressor being optically coupled to a second output of the de-interleaver for temporally de-chirping the multiplexed modulated optical signal pulses in the even wavelength channels with a temporal chirp of opposite sign to the temporal chirp applied by the second optical signal pulse stretcher for reconstructing the multiplexed modulated optical signal pulses in the even wavelength channels;

iii) a first demultiplexer having an input optically coupled to an output of the first optical signal pulse compressor for demultiplexing the reconstructed multiplexed modulated optical signal pulses in the odd wavelength channels to reconstruct the modulated optical signal pulses in each of the odd wavelength channels, a second demultiplexer having an input optically coupled to an output of the second optical signal pulse compressor for demultiplexing the reconstructed multiplexed modulated optical signal pulses in the even wavelength channels to reconstruct the modulated optical signal pulses in each of the even wavelength channels,

iv) a first array of first optical detectors, each of the first optical detectors being connected to an associated output of the first demultiplexer for converting the reconstructed modulated optical signal pulses in the odd wavelength channels to modulated electrical signal pulses, each of the first optical detectors having an associated filter electrically connected thereto for

filtering the modulated electrical signal pulses produced therein with each filter having a predefined filter bandwidth for removing out-of-band frequency components due to four wave mixing arising from multiplexing the modulated optical signal pulses in the odd wavelength channels, a second array of second optical detectors, each of the second optical detectors being connected to an associated output of the second demultiplexer for converting the reconstructed modulated optical signal pulses in the even wavelength channels to modulated electrical signal pulses, each of the second optical detectors having an associated filter electrically connected thereto for filtering the modulated electrical signal pulses produced therein with each filter having a predefined filter bandwidth for removing out-of-band frequency components due to four wave mixing arising from multiplexing the modulated optical signal pulses in the even wavelength channels.

73. The optical communication network according to claim 72 wherein the optical signal modulators produce modulated optical signals pulses in a return-to-zero (RZ) format.

74. The optical communication network according to claim 73 including at least one optical amplifier inserted between optical signal pulse interleaver and the optical signal pulse de-interleaver for amplifying the temporally-chirped multiplexed modulated optical signal pulses.

75. The optical communication network according to claim 74 wherein the at least one optical amplifier is two optical amplifiers, an optical boost amplifier being inserted between the optical signal pulse interleaver and the optical fiber, and wherein an optical pre-amplifier is inserted between the optical fiber and the optical signal pulse de-interleaver.

76. The optical communication network according to claim 75 wherein the two amplifiers are erbium-doped fiber amplifiers (EDFAs).

77. The optical communication network according to claim 75 wherein the two amplifiers are semiconductor optical amplifiers (SOAs) or Raman amplifiers.

78. The optical communication network according to claim 73 wherein the optical fiber includes at least two spans of optical fiber, including at least one optical boost amplifier inserted between the at least two spans of optical fiber.

79. The optical communication network according to claim 73 wherein each optical signal pulse stretcher includes a chirped fiber Bragg grating optically coupled to an optical branch device, and wherein a chirp of the chirped fiber Bragg grating is chosen in such a way that the optical pulses in each of the even and odd wavelength channels are stretched by a desired amount, and wherein each optical signal pulse compressor includes a chirped

fiber Bragg grating optically coupled to an associated optical branch device, and wherein a chirp of the chirped fiber Bragg grating is chosen in such a way that the optical pulses in each of the even and odd wavelength channels are compressed by a desired amount.

80. The optical communication network according to claim 73 wherein each optical signal pulse stretcher includes a segment of dispersive optical fiber having a chromatic dispersion value chosen in such a way that the optical pulses in the even and odd wavelength channels are stretched by an appropriate amount, and wherein each optical signal pulse compressor includes a segment of dispersive optical fiber having a chromatic dispersion value chosen in such a way that the optical pulses in each of the even and odd wavelength channels are compressed by an appropriate amount.

81. The optical communication network according to claim 73 including processing means connected to the optical communication network for performing forward error correction to further enhance the system performance.